ABSTRACT

A cast-in-place and lithographically shaped mobile, monolithic polymer element for fluid flow control in microfluidic devices and method of manufacture. Microfluid flow control devices, or microvalves that provide for control of fluid or ionic current flow can be made incorporating a cast-in-place, mobile monolithic polymer element, disposed within a microchannel, and driven by either fluid or gas pressure against a retaining or sealing surface. The polymer elements are made by the application of lithographic methods to monomer mixtures formulated in such a way that the polymer will not bond to microchannel walls. The polymer elements can seal against pressures greater than 5000 psi, and have a response time on the order of milliseconds. By the use of energetic radiation it is possible to depolymerize selected regions of the polymer element to form shapes that cannot be produced by conventional lithographic patterning and would be impossible to machine.